

SIEMENS

Mammomat 3 / -Stereo

SP

Maintenance Instructions

The maintenance protocol
RXB7-211.105.02.01.02
is required for this instructions

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1 General

1.1 Training

- Training workshop and at least 1 installation.

1.2 Required documents

- | | |
|--|-----------------------|
| • System adjustment instructions | RXB7-220.032.01.02.02 |
| • System service instructions | RXB7-211.061.02.01.02 |
| • Service instructions "Changing the lamp for object illumination" | RXB7-210.061.01.01.02 |
| • Project documents | RXB7-211.021.01.01.02 |
| • MAMMOMAT circuit diagram | G2163 |
| • Installation instructions | RXB7-211.031.01.03.02 |
| • Generator adjustment instructions | RXB7-211.032.01.03.02 |
| • Generator service instructions | RXB7-211.061.01.02.02 |
| • Maintenance protocol | RXB7-211.105.02.01.02 |
| • Operating instructions | RXB7-211.201... |
| • Supplement to operating instructions (Stereo) | RXB7-220.203.01.01.02 |

1.3 Required tools, measurement and auxiliary devices

NOTICE

All tools, measurement and auxiliary devices listed, with the exception of those marked with " * ", are specified in ARTD (Part 3).

- Oscilloscope
- Digital multimeter
- mAs meter
- Service PC with connection cable, PT emulation or pocket terminal
- SIB phantom or Normi 7 or 4 cm Plexi or customer phantom*
- Sensitometer / Densitometer
- Film packet 24 x 30 or larger
- Cleaning agents* specified in the operating instructions
- Protective conductor meter
- Spring scale 0-20 kp (1 kp increments) with cord*
- Water level
- Spray enamel* according to the PG (to touch up chipped paint)
- Standard installation tools

1.4 Required lubricants

- All-purpose grease PD2
- Viscogen oil

1.5 Text emphasis

⚠ WARNING

“WARNINGS” are information provided with special emphasis when there is the potential for personal injury to the operator or patient.

CAUTION

“CAUTIONS” are information provided with special emphasis when there is the potential for damage to the equipment.

NOTICE

“NOTICES” are information provided with special emphasis to facilitate proper use of the equipment or proper execution of a procedure.

1.6 Safety information and preventive measures

CAUTION

- When completing repair work and tests, please note:
 - the product-specific safety information in the document,
 - the safety information in RA0-000.012.40... , as well as
 - the general safety information contained in the TI folder in Register 2.
- When the system is switched off via the operating panel or S2/ D711, line voltage is still present at the line voltage connection for the generator, at the line voltage filter Z1, at transformer T1, at transformer T10 and on board D711 (refer to circuit diagram).
- After switching off the system, approximately 380V DC may be present in the intermediate circuit as indicated by the V24 LED on board D710. Within 3 minutes, the voltage will drop to less than 30 V, and the LED will go out.
- Tests or adjustments that must be made with radiation switched on are identified with the radiation warning symbol  . During these types of adjustments, radiation protective clothing must be worn.

2 System

2.1 Checks

PMP Radiation protection

- Check the radiation protection shield for possible damage (1/Fig.1).
- Information regarding the lead equivalent value must be legible.

SIM Swivel arm / PPS tube - attachment

- Check the swivel arm / PPS tube - attachment by pulling on both support rails (minimum play of approximately $\pm 2^\circ$ is correct). (2/Fig.1).

SIM Basic table

- Check the mounting of the basic table as well as the locking mechanism for the exposure system (3/Fig. 1).

PMP Head guard and compression fixtures

- Check the head guard and compression fixtures for correct seating and for damage (4/Fig.1).

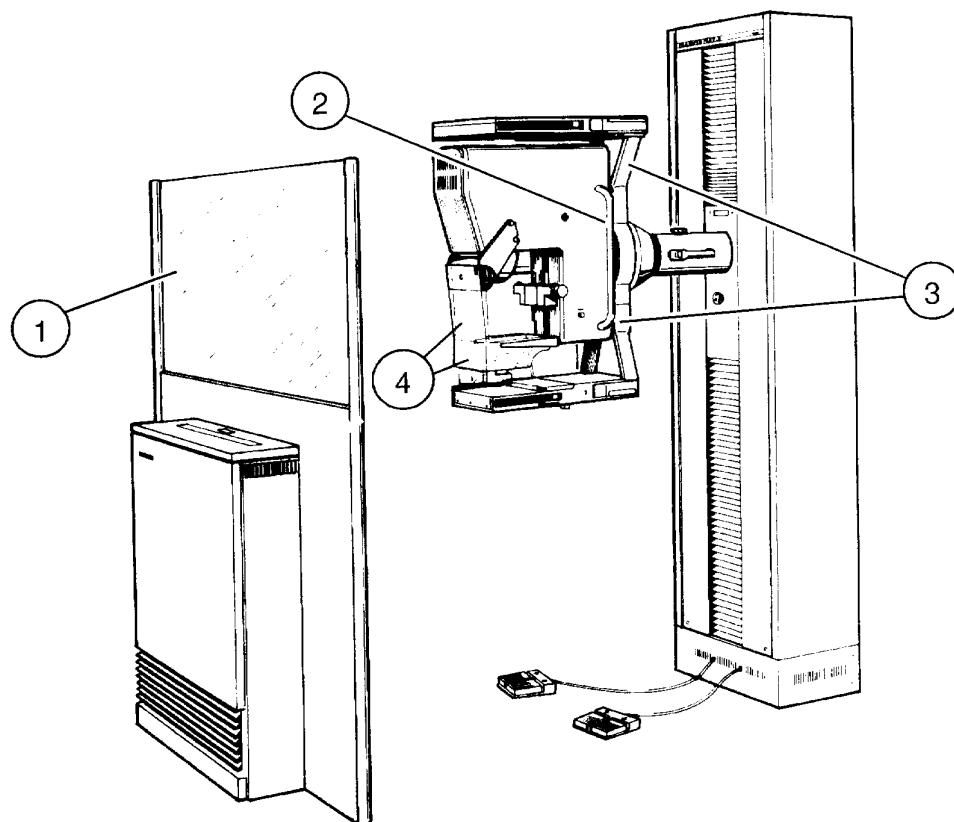


Fig. 1

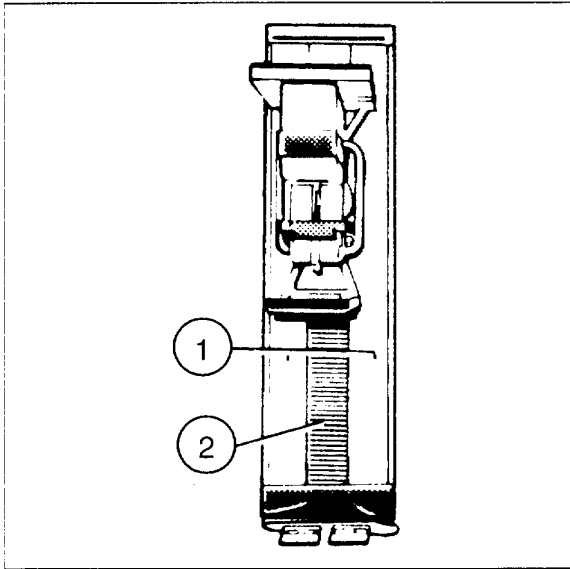


Fig. 2

2.2 Preparations

2.2.1 Removing the column covers

- Remove both lateral front covers (1/Fig.2) by removing the screws.
- Remove the upper and lower bellows (2/Fig.2) by removing the screws.

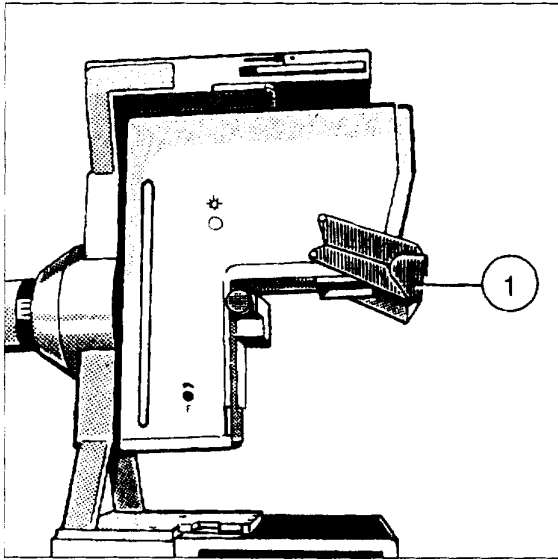


Fig. 3

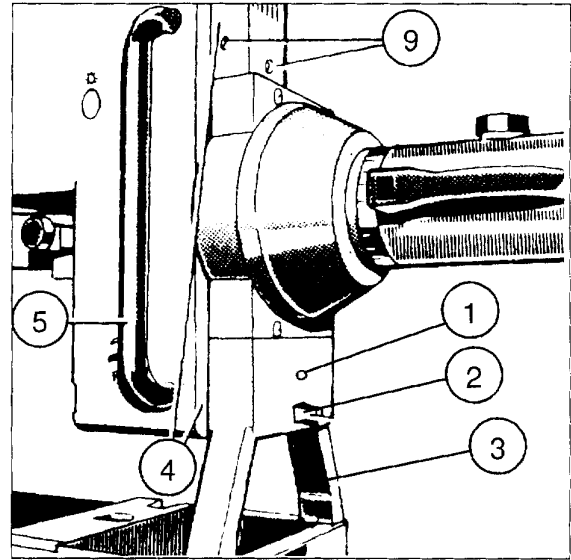


Fig. 4

2.2.2 Removing the swivel arm covers

- Remove the head guard (1/Fig.3) by removing the screws.
- Unlock the system support and rotate it horizontally.

NOTICE

For systems with only one table, remove the screws first (1/Fig.4). This unlocks the rotation lever (2/Fig.4). The system support is not counterbalanced.

- Loosen the four Allen screws(4/Fig.4) for both handles by (5/Fig.4) approximately two revolutions and remove the handles.

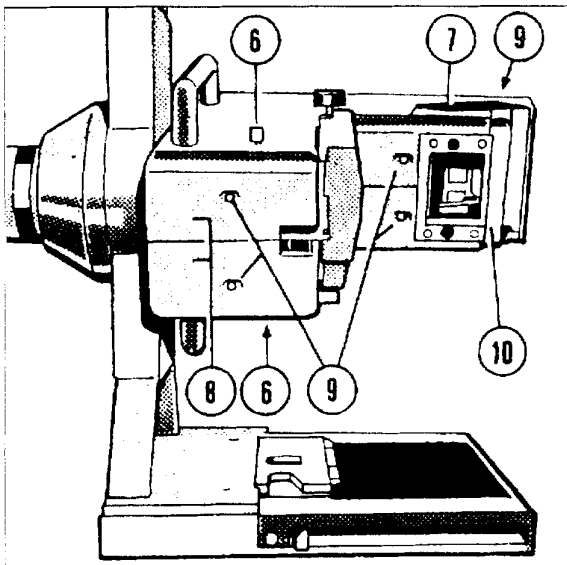


Fig. 5

- Remove both caps from the compression adjustments; loosen the nuts on the cone and remove the knobs (6/Fig.5).
- Remove the front cover of the collimator (10/Fig.5) .
- Remove the six screws (9/Fig.4/5) on the column top cover and remove both parts (8/ Fig.5) of the cover.

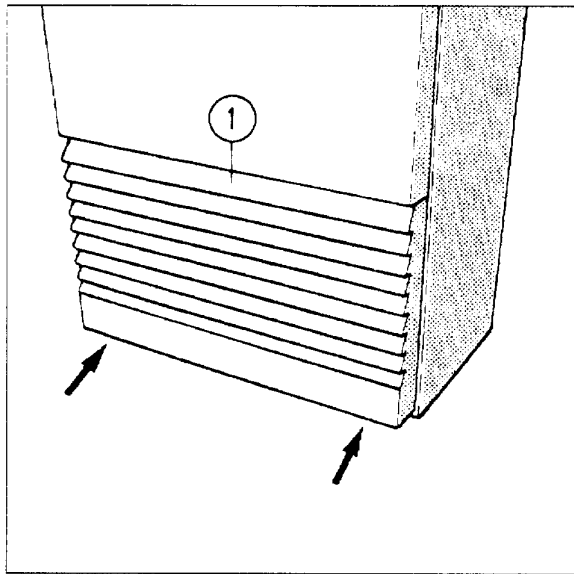


Fig. 6

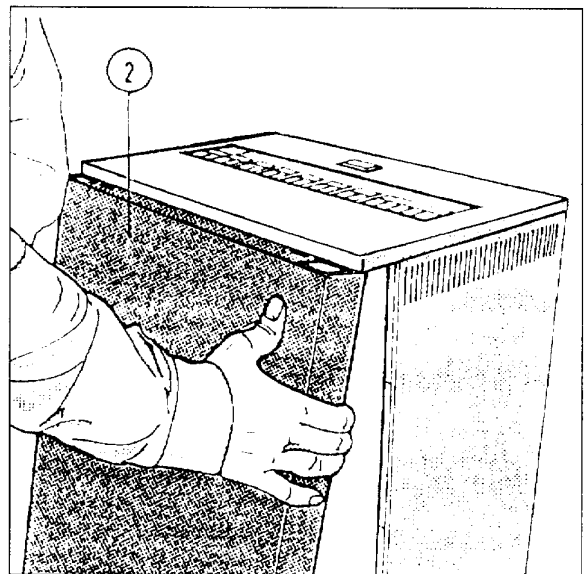


Fig. 7

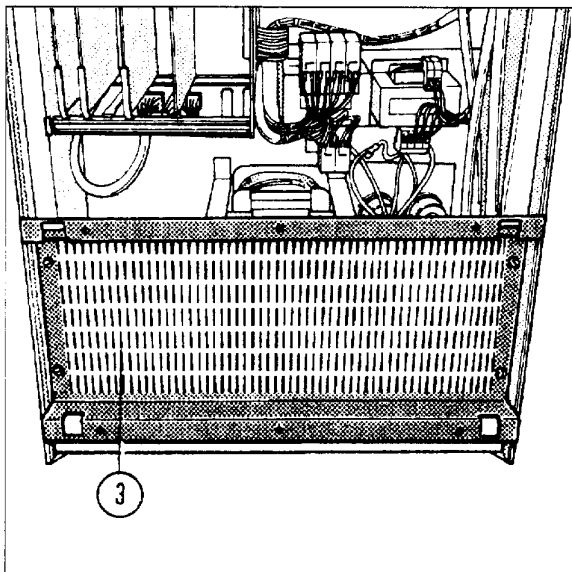


Fig. 8

2.2.3 Removing the generator covers

- Snap out the lower plastic cover (1/Fig.6) and remove it (to do this, press the latches according to the arrow in Fig. 1 toward the top.)
- Remove the screws from the upper front plate (2/Fig.7) and remove the cover.
- Remove the (3/Fig.8) metal grate.

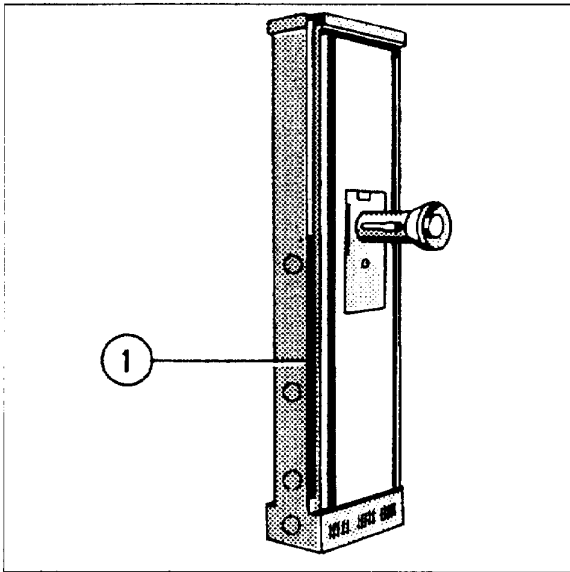


Fig. 9

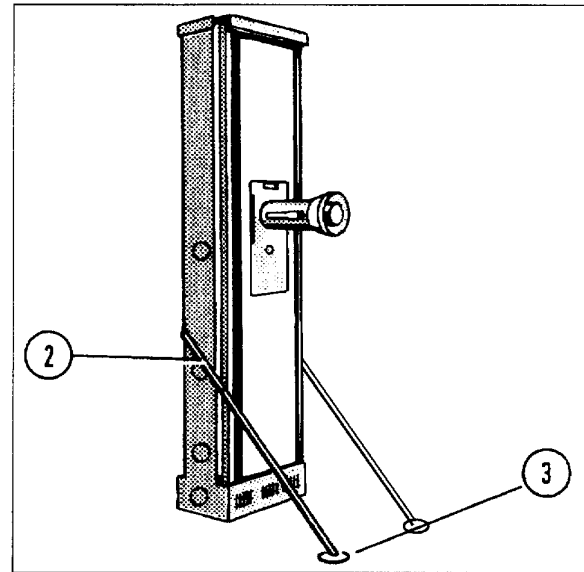


Fig. 10

2.2.4 Deinstallation of the column stand - when the back wall is not accessible

NOTICE

Remove the back cover to facilitate working on the column stand (this is advisable but not absolutely required).

If Speed Info 34-94 ("Screws for the rotating counterbalance may loosen") has not been performed as yet, the back wall must be removed in any case.

- Remove both lateral panels from the column.

NOTICE

Required only if the back of the column stand is not accessible.

- Remove **both** support brackets from the park position (1/Fig.9) by removing the screws and attach them to the **left and right** of the column stand as shown in 2/Fig.10 as stabilizers.
- Place a plastic holder underneath them (3/Fig.10) to protect the floor.

CAUTION

When loosening the column mounting screws, make sure that the support brackets are tightened down, otherwise the column may tip over.

- Remove the four column stand screws from the base plate.
- Slowly pull the column stand toward the front being careful of the cable connections from the column to the generator.

NOTICE

Do not remove the cable that connects the column stand to the generator.

3 Column stand

3.1 Checks

SIM Floor support

- Check the floor support between the generator and the stand (if not disassembled).

SIE Cables

- Check the condition of cables that are visible.

SIM Steel ropes

- Do the steel ropes (counterbalance), the suspension or the pulleys show any damage e. g. fraying or signs of wear?

PMA Applying oil and grease

- If they are okay, lightly oil the rope and grease the rails.

SIE Limit switches

- Switch ON the system and move the lifting carriage up and down several times.
- Do the limit switches stop the carriage travel at the top and at the bottom?

PMF Vertical travel

- Is the vertical travel smooth and noise-free?

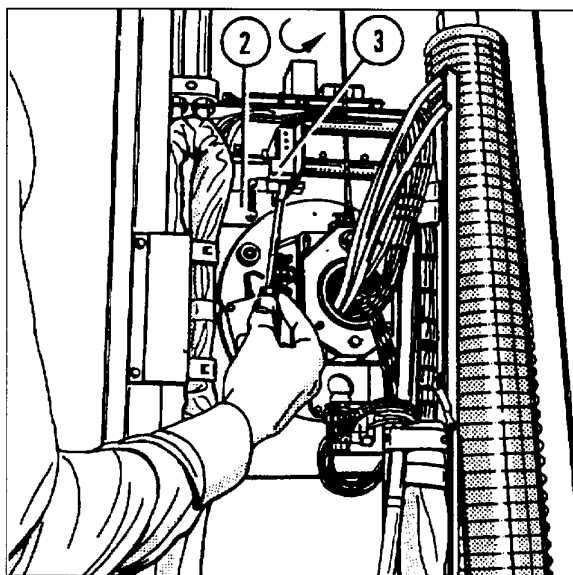


Fig. 1

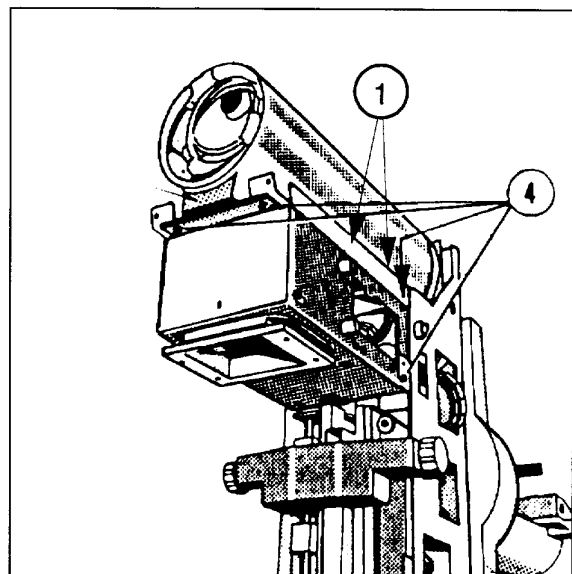


Fig. 2

SIM Safety catch

- To lock in the safety catch (2/Fig. 1), press the locking lever (3/Fig. 1) in the direction of the arrow with the screwdriver (Fig. 1).
- Now the lifting carriage can no longer travel down.
- You should not be able to rotate the swivel arm.
- Disengage the safety catch.

SIM X-ray tube mounting

- Check the mounting for the X-ray tube unit (1/Fig. 2).

SIM Collimator mounting

- Check the mounting for the collimator (4/Fig. 2).

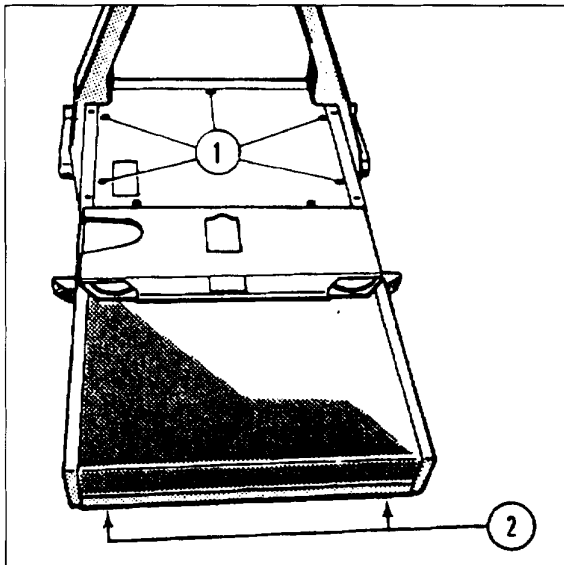


Fig. 3

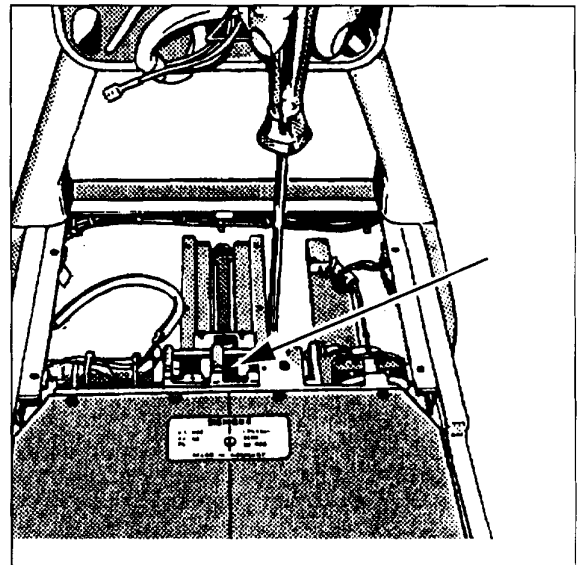


Fig. 4

PMA Grease the grid spindle

- Remove the five screws (1/Fig.3).
- Remove the two cover screws (2/Fig.3).
- Remove the entire cover from the grid table.
- Lightly grease the grid spindle (arrow /Fig.4). Reattach the patient tabletop.

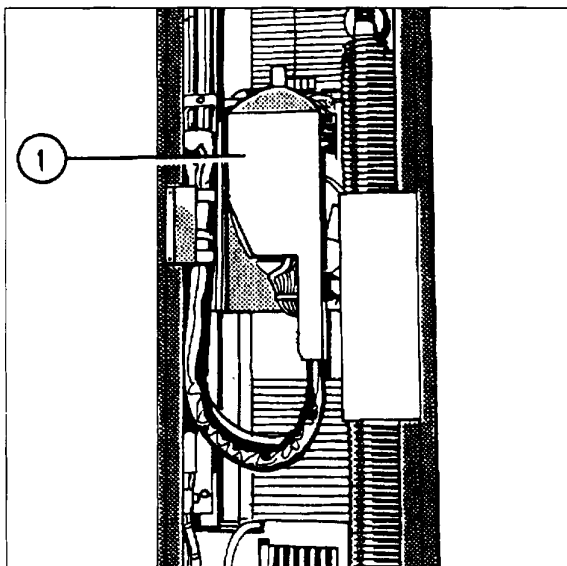


Fig. 5

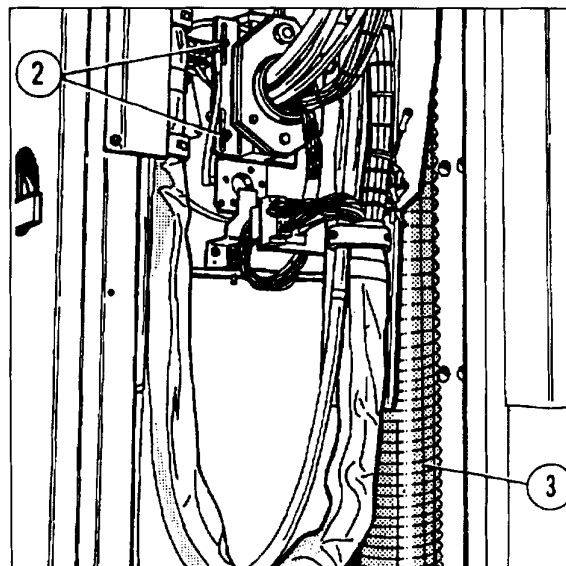


Fig. 6

SIM Check the screws for the rotating counterbalance

- If Speed Info 34-94 has not been completed yet, secure the four screws (2/Fig.6) of the counterbalance with Loctite as follows:
 - Remove the screws from the cable guide plate (1/Fig.5).
 - Remove one screw.
 - Clean the lightly oiled threads and the screw (e. g. degreaser).
 - Secure the screw with LOCTITE 270 (Item number 20 48 866).
 - Continue in the same way until all screws are secure.

4 Compression and system movements

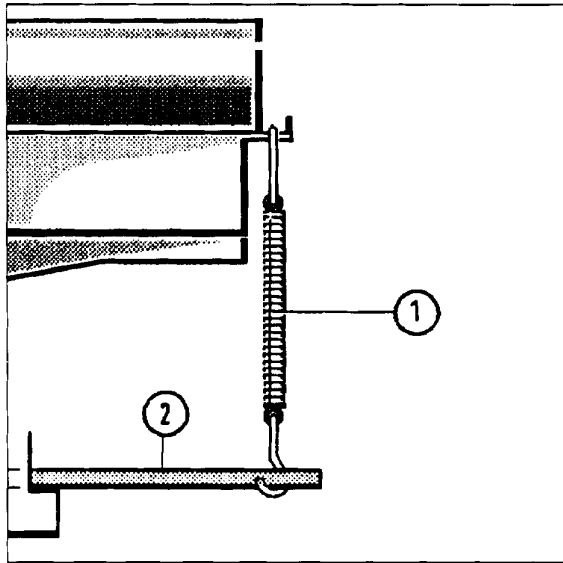


Fig. 1

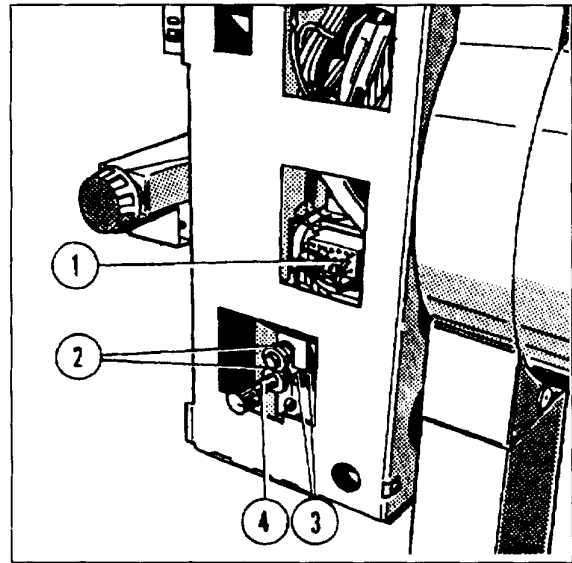


Fig. 2

4.1 Testing the "compression" function

Measure the compression force

- Insert the rod (2/ Fig. 1 from the service kit) into the compression plate holder.
- Attach the spring scale as shown in 1/ Fig. 1 between the tube mounting and the rod (2/ Fig. 1) of the compression plate holder.

4.1.1 Testing compression switch off

- System ON.

PMF Presetting

- Select any value (e.g. 6kp) on the potentiometer (4/ Fig. 2) and activate compression electronically.
- ⇒ Does the compression unit switch off at the preset value?

SIE Max. value switch off

- Select the maximum value (15/20 kp) (2/ Fig. 1) on the potentiometer.
- ⇒ Does the unit switch off when it reaches the maximum value?

SIE Compression force

- Check that the compression force displayed agrees with the compression force measured.

SIE Blocking

- The vertical travel and the swivel movement must be blocked at a compression force of > 1 kp.

4.2 Testing the “decompression” function**SIE Switch off at counterpressure**

- Decompression must switch off at a counterpressure of 5 kg.

PMF Compression movement

- Is the compression movement (compression and decompression) smooth and noise-free?

4.3 Compression thickness display**PMF Compression plate**

- Move the compression plate to its fullest height and measure this distance. The display must agree with the value measured.

4.4 Checking miscellaneous system movements**4.4.1 Check**

- System ON.

SIM Blocking the swivel movement

- Swivel movements must be blocked when the system is off, i.e. when the switch is not activated.
- When activating the rotational movement switch, the brakes must be released and rotation must be possible.

4.5 Collimator**SIM Selecting a filter**

- Various filters can be inserted independent of the kV value selected. Select all kV values and visually check that the correct filter is inserted in the collimator.
Allocation of the kV filter depends on the system configuration (refer to the data sheet).

SIM Snapping the mirror in and out

- The mirror must snap in when the light localizer is switched on (switch-on key or compression footswitch), and it must snap out again at the end of the programmed duration.

5 Test exposures

- System OFF.
- Connect the following measurement devices:
 - Service PC to D702.
 - S3 on D702 to position "1".
 - Oscilloscope to TP kV actual ($1V \triangleq 5kV$) and mA actual ($1V \triangleq 40mA$) on D705.
 - mAs meter to D710 (remove jumpers X3 - X4).
 - Connect the multimeter to the tube between H3 and G (measurement range 200V=).
- System ON.
- Check the kV/mA control loop according to the generator/adjustment instructions, chapter 3 "High voltage tests."



PMF Blocking exposure release

- Exposure release must be blocked under the following conditions (indicated on the control console):
 - Table not correctly locked in.
 - Stereo only: no stereo collimator attached to the existing collimator, grid not removed, Iontomat detector not close to chest wall.
 - Grid not removed for magnification (if there is no other program).
 - Grid not locked into position.

5.1 Evaluation of measurements

PMF Tube assembly boost

- Evaluate the tube assembly boost (acoustic).

PMF kV and mA

- Do the measured kV and mA values agree with the values selected?

PMF mAs post display (for Iontomat mode)

- Do the mAs values agree with the mAs post display?

PMF mAs mode

- Do the mAs values agree with the values measured?

PMF Grid voltage

- Does the grid voltage measured (small focus) agree with the value in the test protocol?
 - Select the small focus by inserting the magnification table.

PMF Signal lamp

- Does the radiation ON indicator light up?

5.2 Testing the dose rate control**PMF****Dose rate control**

- Cover the measurement field (e. g. with a lead apron) and release an exposure.
- Does dose rate control switch the exposure off after approximately 100 ms?
- Check both tables. (if present)
- Remove the measurement devices.

5.3 Testing the radiation field / light field

- Check the coincidence of light and radiation fields according to the service instructions "Changing the lamp for object illumination".

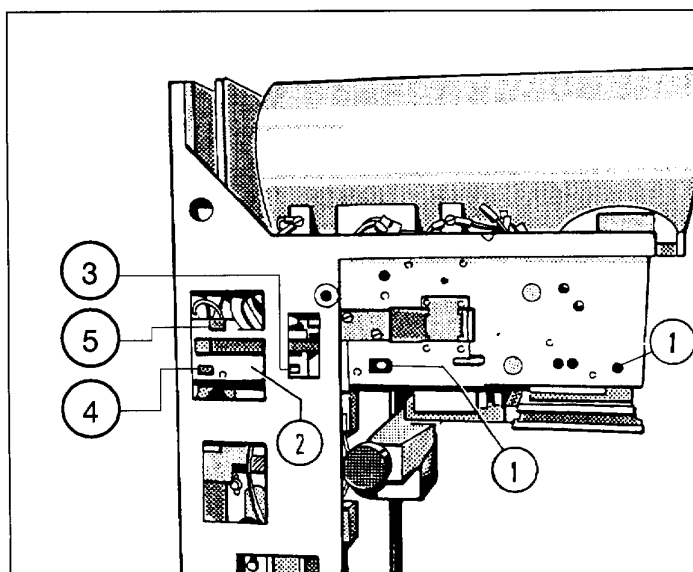


Fig. 1

5.4 Checking collimation selection

PMP Changing the focus

- Remove the grid and insert the magnification table. The unit should switch over to the small focus.
- Collimation should be within the field (refer to axis 1/Fig. 1).

PMP Changing the format

On systems with stereo collimator:

- Change the table e.g. from 18 x 24 to 24 x 30 (if present).
- The front collimator must automatically adjust.
- Limit switches are assigned as follows:
 - S50 (3/Fig.1) grid table 18 x 24
 - S51 (4/Fig.1) grid table 18 x 24
 - S52 (5/Fig.1) Xerox table
- Grease the spindle.

On units without stereo:

- Check the mechanical movement of the collimator.

5.5 Testing the image quality

QIQ Image quality

Prerequisite: Film developer must be working correctly.

To test the sensitometer / densitometer

- Select the most frequently used exposure system (e. g. grid table 18 x 24).
- Load the "test cassette" with film and insert it.
- Position the SIB phantom over 2 cm Plexiglas or other IQ phantom (e.g. Normi 7).
- Select the most frequently used kV value, Iontomat and automatic decompression.
- Compress and release exposure.



PMF Automatic decompression

- Does decompression occur automatically after the exposure is ended? (if programmed)
- In addition, expose a sensitometer strip and develop the exposure.

5.6 Evaluating the films

QIQ Phantom exposures

- Compare the phantom exposure with those on hand and /or archive them for the next maintenance as starting values.

6 Miscellaneous

6.1 Tests

SIE Emergency STOP

- Press emergency STOP on the unit (must lock in).
 - Motorized compression, rotation and lifting carriage must be blocked.
- Release emergency STOP.

PMF Indicators

- Check the LED's on the operating console by starting an LED test (refer to the Service instructions, chapter 10). In addition, activate D740.S23 (right).

PMP Error memory

- Read out the error memory and the exposure counter with the service PC.

PMP Record the error memory

PMP Delete the error memory

- Enter the data from the exposure counter and the error memory in the protocol and delete the error memory o n l y.

PMF Auxiliary voltages

- With the voltmeter, measure the auxiliary voltages according to circuit diagram X2117-15 and G2163-30.
- System OFF.

PMA High voltage cable and plug:**NOTICE**

DIN VDE 0750 section 21 (IEC 601-2-7) paragraph 16:

"Accessible high voltage cables that conduct X-ray tube voltage must be provided with flexible conductive shielding which has a maximum resistance of 1 Ohm/m.

The shielding must be connected to the metal housing of the high voltage source H1 (X-ray generator) as well as the X-ray tube."

⚠ WARNING

Wait until LED V24 on D710 goes out (approx. 3 min.).

- Disconnect the high voltage cable from the receptacle at the generator and measure the shielding resistance against ground. When doing this flex the cable, especially the bends and loops.

NOTICE

Replace high voltage cables whose shielding exceeds a maximum resistance of 1 Ohm/m. The length of the high voltage cable is 10 m.

- Check the high voltage cable plug and the high voltage receptacle for damage (burn marks, cracks).
- Reinstall the cables.
- Check that the high voltage cable plug is firmly seated.

PMF Cassette locking

- Check that the cassettes used lock properly into the object tables.

PMF Stereo unit

- If present, check the stereotactic biopsy unit according to the operating instructions.

PMA UI's and SPEED Infos

- Check whether all relevant UI's and SPEED Infos have been completed.

6.2 Concluding work

- System OFF

PMF Operating problems

- Were there any operating problems during the checks?

PMP Covers

- Reinstall all covers. Check that all covers are complete and firmly seated, including the cable duct.

SIE Protective conductor test

- Perform the protective conductor test according to TI 236.
- Attach the generator cover.

PMP Cleaning / Damaged paint

- Clean the unit using the materials recommended in the operating instructions and repair any damaged paint.
- System ON.

QSQ Final test exposure

- Take one final test exposure.

TDSP 2 / Guggenmos
TDSP 1 / Groß
SMS Iselin / O'Donnell

Diese Seite wurde bewußt leer gelassen.